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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

November 1968 United States Employment Service Technical Report S-271 R

S-271 R

ED 065617

Development of USES Aptitude Test Battery

for

Nurse, General Duty

(medical ser.) 075.378

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U.S. DEPARTMENT OF LABOR

MANPOWER ADMINISTRATION

Technical Report on Development of USES Aptitude Test Battery

For . . . .

Nurse, General Duty (medical ser.) 075.378

S-271R

(Developed in Cooperation with the
Arizona State Employment Service)

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November 1968

FOREWORD

The United States Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

Charles E. Odell, Director
U.S. Employment Service

GATB Study # 2719, 2720

DEVELOPMENT OF USES APTITUDE TEST BATTERY

FOR

Nurse, General Duty (medical ser.) 075.378-014

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Nurse, General Duty (medical ser.) 075.378-014. The following norms were established:

	GATB Aptitudes	Minimum Acceptable GATB Scores
G	General Learning Ability	100
N	Numerical Aptitude	95
Q	Clerical Aptitude	100
K	Motor Coordination	95

RESEARCH SUMMARY

Final Sample:

Eighty female student nurses at two hospital-operated nurse training schools located in Phoenix, Arizona.

Criterion

Graduation from 3-year nurse training program.

Design:

Longitudinal (test data collected at the beginning of the training and criteria collected at the end of training.)

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, and selective efficiencies.

Predictive Validity:

Phi Coefficient = .41 ($P/2 < .0005$)

Effectiveness of Norms:

Only 74% of the non-test selected students in the final sample graduated. If the students had been test selected with the recommended norms, 85% would have graduated. 26% of the final sample were scholastic failures. If students had been test selected with the recommended norms, only 15% would have been failures. The effectiveness of the norms is shown graphically in Table 1.

TABLE 1

EFFECTIVENESS OF NORMS

	Without Tests	With Tests
Graduates	74%	85%
Failures	26%	15%

SAMPLE DESCRIPTION

Size:

80

Occupational Status

Trainees

Training Setting:

Sample was trained by staff at Good Samaritian, and St. Joseph's Hospitals.

Student Selection Requirements:

Education: High school graduates preferred

Previous Experience: None indicated

Tests: Scholastic ability test at both schools.

Other: Good Samaritan required at least one unit of high school biology or chemistry.

Principal Activities:

A similar curriculum outline was used at both hospitals to train the sample for the job described in the Fact Sheet in the appendix.

TABLE 2

Means, Standard Deviations (SD), Ranges, Biseral Correlations with graduate/fail Criterion (r_{bis}), Standard Errors of Biseral Correlations (σr_{bis}) and Pearson Product-Moment Correlations with the Grade-Point Average Criterion (r) for Age and Education.

	Mean	SD	Range	r_{bis}	σr_{bis}	r*
Age (years)	19.3	5.9	17-64	.055	.151	.141
Education (years)	12.3	.5	12-14	.249	.144	.202

*Pearson Product-Moment Correlations (r) with grade-point average with N = 59 (total graduate group)

EXPERIMENTAL TEST BATTERY

All 12 parts of the GATB, B-1002B, were administered on various dates in September 1963 and September 1964. IBM answer sheets were used.

CRITERION

The sample was dichotomized into Graduates and Failures for the final criterion. The "Failure" group includes both those who were dropped for poor scholarship and those who left voluntarily while in a failing or near failing status. For the graduate group, a grade-point average criteria was available.

Grade Point Average Distribution:	Range:	1.99 - 3.89
	Mean:	2.69
	Standard Deviation:	.44

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Tables 3, 4, and 5 show the results of qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job description, the aptitudes indicated appear to be important to the work performed.)

Aptitude	Rationale
G - General Learning Ability	Necessary to reach specific level of learning, to absorb training, make judgments, recognize and interpret symptons and reactions.

V - Verbal Aptitude	To be able to read and understand written and oral instructions, to communicate information effectively to physicians, patients, and other nursing staff.
Q - Clerical Perception	Accuracy in perceiving correctly instructions regarding dosages of medication, recording patient signs and reactions, keeping all medical records.
M - Manual Dexterity	Handle instruments, applying medical dressings, handling patients.

TABLE 4

Means, Standard Deviations (SD), Ranges, Biseral Correlations with graduate/fail Criterion (r_{bis}), Standard Error of Biseral Correlations (σr_{bis}), and Pearson Product-Moment Correlations with the Grade-Point Average Criterion (r) for the Aptitudes of the GATB.

	M	SD	Ranges	r_{bis}	σr_{bis}	r
G - General Learning Ability	116.5	12.0	82-145	.343	.138*	.400**
V-- Verbal Aptitude	118.0	12.7	72-149	.276	.143*	.271*
N - Numerical Aptitude	112.7	12.6	81-144	.350	.137*	.270*
S - Spatial Aptitude	113.2	14.3	84-143	-.100	.150	.104
P - Form Perception	116.1	16.3	75-159	.036	.042	-.045
Q - Clerical Perception	115.4	14.3	89-154	.303	.141*	.092
K - Motor Coordination	111.9	13.9	78-148	.291	.142*	.075
F - Finger Dexterity	107.3	14.3	77-144	.155	.148	-.058
M - Manual Dexterity	107.4	17.4	67-143	.200	.147	.066

* Significant at the .05 level
** Significant at the .01 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important	X	X				X			X
Irrelevant				0	0				
Relatively High Mean	X	X			X	X			
Relatively Low Standard Dev.	X	X	X				X		
Significant Correlation with Criterion	X	X	X			X	X		
Aptitudes to be Considered for Trial Norms	G	V	N			Q	K		

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a combination of the degree to which trial norms consisting of various combinations of aptitudes G, V, N, Q, and K at trial cutting scores were able to differentiate between the 74% of the sample labeled graduates and the 26% of the sample labeled failures. Trial cutting scores at five point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For two aptitude trial norms mimimum cutting scores slightly higher than one standard deviation below the mean will eliminate about one-third of the sample; for four aptitude trial norms, cutting scores slightly lower than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. The optimum differentiation for the occupation of Nurse, General Duty (medical ser.) 075.378-014 was provided by the norms of G-100, N-95, Q-100, and K-95. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .41 (statistically significant at the .0005 level.)

TABLE 6

Predictive Validity of Test Norms G-100, N-95, Q-100, and K-95

	Failed Norms	Passed Norms	Totals
Graduates	8	51	59
Failures	12	9	21
Totals	20	60	80

Phi Coefficient (Ø) = .41 Chi Square (X^2_y) = 13.5
Significance Level = P/2 < .0005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

Norms G-100, N-95, Q-100, and K-95 qualify for inclusion in OAP 36 (G-105, Q-100, and K-90). When these norms are applied to the sample data used in this study a Ø of .32, X^2_y of 8.4 and a P/2 of .005 are obtained.

S-271R GATB Study #2720

Nurse, General Duty (medical ser.) 075.378-014

Check Study #1 Research Summary

Sample:

Ninety-four (94) female students in their senior (3rd) year at two hospital-operated nurse training schools. (Good Samaritan and St. Joseph's).

TABLE 7

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Aptitudes of the GATB.

Age, Education, Aptitudes	Mean	SD	Range	r
Age (years)	21.6	2.8	20-30	.142
Education (years)	12.4	.9	12-15	-.054
G - General Learning Ability	116.2	12.6	85-140	.485**
V - Verbal Aptitude	117.7	12.9	92-141	.387**
N - Numerical Aptitude	110.8	13.4	77-144	.472**
S - Spatial Aptitude	112.1	16.5	78-156	.173
P - Form Perception	124.8	16.9	75-164	.185
Q - Clerical Perception	123.1	12.2	96-157	.264**
K - Motor Coordination	118.8	15.0	89-159	-.002
F - Finger Dexterity	107.9	16.3	66-145	.125
M - Manual Dexterity	111.5	19.9	20-168	.066

**Significant at the .01 level

Criterion:
Grade-point averages (good-poor dichotomy at 2.5)

Design:
Concurrent (test and criterion data were collected at approximately the same time).

Concurrent Validity:
Phi Coefficient = .24 (P/2 < .01

Effectiveness of Norms:
Only 59% of the nontest-selected students used for this study were good students; if the students had been test-selected with the S-271R norms, 66% would have been good students. Forty-one percent of the nontest-selected students used for this study were poor students; if the students had been test-selected with the S-271R norms, only 34% would have been poor students. The effectiveness of the norms when applied to this independent sample is shown graphically in Table 8.

TABLE 8

Effectiveness of S-271R Norms
on Check Study Sample

	Without Tests	With Tests
Good Students	59%	66%
Poor Students	41%	34%

TABLE 9

Concurrent Validity of S-271R Norms of
G-100, N-95, Q-100. K-95 on Check
Study Sample #1

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Students	7	48	55
Poor Students	14	25	39
Total	21	73	94

Phi Coefficient (Ø)= .24
Significance Level = P/2 < .025

Chi Square (X^2_y) = 5.7

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CHECK STUDY RESEARCH SUMMARY SHEET FOR S-271R

S-271R GATB Study # 2812

Nurse, General Duty (medical ser.) 075.378-014

Check Study #3 Research Summary

Sample:

71 female registered nurses enrolled in various MDTA RN Refresher courses throughout the State of Minnesota.

This study was conducted prior to the requirement of providing minority group status. Therefore, minority group composition is unknown.

TABLE 13

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Aptitudes of the GATB. N=71

	Mean	SD	Range	r
Age (years)	45.9	7.7	30-66	-.176
Education (years)	12.7	1.5	12-16	.247*
G-General Learning Ability	108.8	12.8	79-138	.396**
V-Verbal Aptitude	113.9	13.6	86-149	.363**
N-Numerical Aptitude	103.9	15.0	76-140	.438**
S-Spatial Aptitude	101.8	16.7	58-137	.143
P-Form Perception	109.1	18.3	61-143	.368**
Q-Clerical Perception	118.0	17.4	72-175	.446**
K-Motor Coordination	109.7	18.6	37-155	.358**
F-Finger Dexterity	85.5	18.5	47-129	.326**
M-Manual Dexterity	88.2	20.3	38-126	.316**

Criterion:

Supervisory ratings collected in 1969.

Design:

Longitudinal (Tests were administered at the beginning of the refresher training period. Criterion collection was begun nine to twelve months after completion of the course)

Predictive Validity:

Phi Coefficient = .27(P/2 $<$ .025

Effectiveness of Norms:

Only 76% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-271R norms, 88% would have been

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good workers. Twenty-four percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-271R norms, only 12% would have been poor workers. The effectiveness of the norms when applied to this independent sample is shown graphically in Table 14.

TABLE 14

Effectiveness of S-271R Norms
on Check Study Sample #3

	Without Tests	With Tests
Good Workers	76%	88%
Poor Workers	24%	12%

TABLE 15

Concurrent Validity of S-271R Norms

On Check Study Sample #3

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	19	35	54
Poor Workers	12	5	17
Total	31	40	71

Phi Coefficient (ϕ) = .27
Significance Level = $P/2 < .025$

Chi Square (X^2Y) = 5.2

Attachment to TESPL 2498

Check Study Summary Sheet for S-271R GATB Study #2750

Nurse, General Duty (medical ser.) 075.378-014

Check Study #2 Research Summary

Sample: One hundred female students constituting five classes enrolled in the schools of nursing at Mercy Hospital, Mason City, Iowa and Mercy Hospital, Dubuque, Iowa.

TABLE 10

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Aptitudes of the GATB.

	Mean	SD	Range	r
Age (years)	19.8	1.5	18-25	.128
Education (years)*	12.0			---

*All students had exactly 12 years of education.

Aptitude	Mean	SD	Range	r
G-General Learning Ability	118.7	11.5	89-148	.433**
V-Verbal Aptitude	116.6	10.5	82-147	.340**
N-Numerical Aptitude	120.3	11.3	92-146	.431**
S-Spatial Aptitude	109.5	15.6	78-156	.231*
P-Form Perception	121.1	15.2	74-159	.257**
Q-Clerical Perception	122.6	13.8	82-162	.283**
K-Motor Coordination	116.3	13.0	58-148	.180
F-Finger Dexterity	113.6	17.1	70-161	.226*
M-Manual Dexterity	106.6	17.3	48-144	.176

*Significant at the .05 level
**Significant at the .01 level

Criterion: Grade-point average (good-poor dichotomy at 2.45)

Design: Longitudinal (test data were collected at the beginning of the training program and criterion were collected after completion of the program in 1967)

Predictive Validity: Phi coefficient = .19 ($P/2 < .05$)

Effectiveness of Norms

Only 66% of the nontest-selected students used for this study were good students; if the students had been test-selected with the S-271R norms, 70% would have been good students. Thirty-four percent of the nontest-selected students for this study were poor students; if the students had been test-selected with the S-271R norms, only 30% would have been poor students. The effectiveness of the norms when applied to this independent sample is shown graphically in Table 11.

TABLE 11

Effectiveness of the S-271R Norms
on Check Study Sample #2

	Without Tests	With Tests
Good Students	66%	70%
Poor Students	34%	30%

TABLE 12

Predictive Validity of S-271R Norms of G-100, N-95, Q-100 and K-95 on Check Study Sample #2

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Students	4	62	66
Poor Students	7	27	34
Total	11	89	100

Phi Coefficient (ϕ) = .19
Significant level = $P/2 < .05$

Chi Square (X^2Y) = 3.5

GPO 881-461

November 1968

S-271R

FACT SHEET

Job Title

Nurse, General Duty (medical ser.) 075.378-014

Job Summary

Provides nursing care to patients confined within an assigned hospital area according to recognized standards and follows instructions set forth by the physician and immediate supervisor.

Work Performed

Acts as team leader when assigned, directing the activities of a nursing team. Assigns specific patients to team members; assigns job duties to team members in carrying out department workload. Visits patients in assigned hospital area to observe their general condition; observes for symptoms of pain, discomfort, or change in mental or physical condition. Reports any unfavorable reaction or symptom of patient to head nurse, supervisor, or physician immediately. Reviews surgery schedule to determine which patients require pre-operative preparation.

Directs the activities of licensed practical nurses, practical nurses, student nurses, and student practical nurses. Accompanies physician and head nurse on rounds of assigned area, assists in recording of treatment or medicinal changes, and provides physician with pertinent information regarding patient's condition. Administers shots, intravenous injections, narcotics, hypnotics, blood transfusions, and medications as prescribed by physician. Takes and records temperature, respiration, pulse count, blood pressure, and weight of patient as required. Passes out food trays and feeds those patients requiring assistance. Reviews medicine cards of assigned patients and insures that medicine supply is adequate by ordering required supplies.

Effectiveness of Norms

Only 74% of the non-test-selected students used for this study were good students; if the students had been test-selected with the S-271R norms, 85% would have been good students. 26% of the non-test-selected students used for this study were poor students; if the students had been test-selected with the S-271R norms, only 15% would have been poor students. (Validation sample)

Only 59% of the nontest-selected students used for this study were good students; if the students had been test-selected with the S-271R norms, 66% would have been good students. 41% of the nontest-selected students used for this study were poor students; if the students had been test-selected with the S-271R norms, only 34% would have been poor students. (Cross validation sample)

Applicability of S-271R Norms

The aptitude test battery is applicable to jobs which include a majority of duties described above.

GPO 865-007

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